

## A.2 Observer Data Sheet

## Observer Data Sheet

### DfE PWB Performance Demonstrations

Facility name and location: \_\_\_\_\_

MHC Process type: \_\_\_\_\_ Installation Date: \_\_\_\_\_

Date: \_\_\_\_\_ Contact name: \_\_\_\_\_

<b>Test Panel Run</b>		
Make and Model of rack or panel transport system:		
Overall MHC process line dimensions		
Length (ft.):	Width (ft.):	Height (ft.):
Temperature of the process room:		
Desmear type (permanganate or plasma):		
Average number of panels per rack:	Average space between panels in rack:	
Average size of panel in rack: Length (in.):	Width (in.):	
At what % of capacity is the line currently running?	At what % of capacity is the line typically running?	
Open the panel bags. Were the bags still sealed the day of the demonstration? If no, when was the bag opened and where/how were the panels stored?		
Place the panels in the system. For rack systems, note the rack configuration (diagram the rack configuration and note the locations of the 3 test panels):		
<b>While running the test panels, verify each process step and complete the table on the next page.</b>		
<b>Overall System Timing:</b> from system start (after loading racks) to system stop (before unloading racks); <i>[Do not include desmear time]</i> :		
After processing the panels through the MHC line, flash plate with 0.1 mil copper. Record the current used and time used:		
Current = _____ A		Time = _____ sec.

**APPENDIX A**

Test Panel Run					
Test Board Serial Numbers: 1. _____ 2. _____ 3. _____					
Bath Name (from schematic)	Tank or Station #	Equipment <sup>a</sup>	Bath Temp	Immersion Time	Drip Time
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					

<sup>a</sup> List number, type of:

<b>Agitation:</b>	<b>Vapor Control:</b>	<b>Filter Type:</b>	<b>Heater Control:</b>	<b>Water Rinses:</b>
[PA] - Panel Agitation	[PP] - Push/Pull	[BF] - Bag	[TH] - Thermostat	[CN] - Continuous
[CP] - Circulation Pump	[BC] - Bath Cover	[CF] - Cartridge	[TM] - Timer	[DP] - Continuous During Process
[AS] - Air Sparge	[FB] - Floating Balls	[OF] - Other	[PR] - Programmed	[PP] - Partial During Process
[OA] - Other (describe)	[FE] - Fully Enclosed	[OH] - Other (describe)	[OW] - Other (describe)	
	[OV] - Other (describe)			

**Verification of Part A** (mark any changes on working copy of Part A):**Throughput:**

Verify the overall throughput (Part A, Q1.1) is recorded as **surface square feet** and that it is equal to the per shift throughput (Part A, Q1.4): **G**

**Ventilation:**

Verify the type of ventilation as recorded in Part A, Question 2.1: **Q**

**Wastewater characterization:**

Review discharge and sludge data recorded in Part A, Question 2.3 with wastewater treatment plant operator. Did the data recorded refer to plant-wide data or MHC process line-specific data?

Verify the estimate of the percentage of waste treatment due to MHC process: **Q**

**Tank volumes:**

Verify the length, width, and nominal volume of each tank, as recorded in Part A: **Q**

**Water Use:**

Verify Part A, Question 3.2, for each tank:

Flow Controls verified	<b>Q</b>
Daily water flow rate verified	<b>Q</b>
Cascade process steps verified	<b>Q</b>

Have you implemented any other water conservation measures on the MHC line?

If yes, describe:

Is water consumption dependent upon capacity of the line?

**Pollution Prevention:**

Have you used any other pollution prevention techniques on the MHC line? (e.g., covered tanks to reduce evaporation, measures to reduce dragout, changes to conserve water, etc.)

If yes, describe and quantify results (note: if results have not been quantify, please provide an estimate):

If your throughput changed during the time new pollution prevention techniques were implemented, estimate how much (if any) of the pollution prevention reductions are due the throughput changes:

Equipment Maintenance	
Estimate the maintenance requirements (excluding filter changes and bath changes) of the MHC process equipment for both outside service calls (maintenance by vendor or service company) and in-house maintenance (by facility personnel).	
Describe the typical maintenance activities associated with the MHC process line (e.g., vibration rack repairs, motor repair/replacement, conveyor repairs, valve leaks, etc.):	
OUTSIDE SERVICE CALLS	
Average time spent per week:	
Average cost:	
Average downtime:	
Do you call service for a recurring problem? If yes, describe:	
IN-HOUSE MAINTENANCE	
Average time spent per week:	
Average downtime:	
Is there a recurring maintenance problem? If yes, describe:	

Rack or Conveyor Cleaning	
Is rack or conveyor cleaned continuously during the process?	
Frequency of rack or conveyor cleaning:	
Number of personnel involved:	
Personal protective equipment (see key):	
Rack Cleaning Method (see key): <b>OR</b>	
Conveyor Cleaning Method (see key):	
Average time required to clean:	
Cleaning chemical used:	
Cleaning schedule (after hours, during hours in MHC room, or during hours outside MHC room)	

## Personal Protective Equipment Key:

[E]-Eye Protection	[G]-Gloves
[L]-Labcoat/Sleeved garment	[A]-Apron
[R]-Respiratory Protection	[B]-Boots
[Z]-All except Respiratory Protection	[N]-None

## Rack Cleaning Method:

[C]-Chemical bath on MHC process line  
 [D]-Chemical bath on another line  
 [T]-Temporary chemical bath  
 [S]-Manual scrubbing with chemical  
 [M]-non-chemical cleaning  
 [N]-None

## Conveyor Cleaning Method:

[C]-Chemical rinsing or soaking  
 [S]-Manual scrubbing with chemical  
 [M]-Non-chemical cleaning  
 [N]-None

Chemical Bath Sampling						
Bath Type	Type of Sampling <sup>a</sup>	Frequency <sup>b</sup>	Duration of Sampling <sup>c</sup>	Protective Equipment <sup>d</sup>	Method of Sampling <sup>e</sup>	Sample Container <sup>f</sup>
Cleaner/Conditioner						
Micro Etch						
Activator/Catalyst						
Accelerator						
Electroless Copper						
Reducer/Neutralizer						
Anti-tarnish/Anti-oxidant						
Other (specify)						
Other (specify)						

<sup>a</sup> Type of Sampling  
 [A]-Automated  
 [M]-Manual  
 [N]-None

<sup>b</sup> Frequency: Enter the average time elapsed or number of panel sq. ft. processed between samples. Clearly specify units (e.g., hours, sq. ft., etc.)

<sup>c</sup> Duration of Sampling: Enter the average time for manually taking a sample from the tank.

<sup>d</sup> Protective Equipment: Consult the key for the above table and enter the letters for all protective equipment worn by the person performing the chemical sampling.

<sup>e</sup> Method of Obtaining Samples:  
 [D]-Drain or spigot  
 [P]-Pipette  
 [L]-Ladle  
 [O]-Other (specify)

<sup>f</sup> Chemical Sample Container  
 [O]-Open-top container  
 [C]-Closed-top container

## APPENDIX A

Energy Usage					
For each piece of equipment in the MHC line using energy, complete the table below:					
Equipment Type, Make, Model	Tank or Station # <sup>a</sup>	Power Rating (from nameplate)	Load (% capacity in use)	Period of Usage	Machine Control
				<input type="checkbox"/> continuous <input type="checkbox"/> continuous during process cycle <input type="checkbox"/> partial during process cycle. If partial, record how often:  <input type="checkbox"/> other:	<input type="checkbox"/> timer <input type="checkbox"/> program <input type="checkbox"/> operator/manual <input type="checkbox"/> other:
				<input type="checkbox"/> continuous <input type="checkbox"/> continuous during process cycle <input type="checkbox"/> partial during process cycle. If partial, record how often:  <input type="checkbox"/> other:	<input type="checkbox"/> timer <input type="checkbox"/> program <input type="checkbox"/> operator/manual <input type="checkbox"/> other:
				<input type="checkbox"/> continuous <input type="checkbox"/> continuous during process cycle <input type="checkbox"/> partial during process cycle. If partial, record how often:  <input type="checkbox"/> other:	<input type="checkbox"/> timer <input type="checkbox"/> program <input type="checkbox"/> operator/manual <input type="checkbox"/> other:
				<input type="checkbox"/> continuous <input type="checkbox"/> continuous during process cycle <input type="checkbox"/> partial during process cycle. If partial, record how often:  <input type="checkbox"/> other:	<input type="checkbox"/> timer <input type="checkbox"/> program <input type="checkbox"/> operator/manual <input type="checkbox"/> other:
				<input type="checkbox"/> continuous <input type="checkbox"/> continuous during process cycle <input type="checkbox"/> partial during process cycle. If partial, record how often:  <input type="checkbox"/> other:	<input type="checkbox"/> timer <input type="checkbox"/> program <input type="checkbox"/> operator/manual <input type="checkbox"/> other:

<sup>a</sup> Specify whether tank number or process flow diagram step numbers are used.

**Comparative Evaluation**

If the facility has switched from a previous system to the current system, complete this page.

**Process History:**

In Part A, Question 3.4, the facility recorded their reason(s) for changing to their current system.

Have they realized this benefit to a greater or lesser extent than expected? Explain and obtain (attach) quantitative information if not given in Part A.

Were any changes made when the line was installed that were not part of the system or were optional (e.g., flow control valves added to water rinses? cascaded water rinses? etc.)? Explain:

**Product Quality:**

What, if any, changes were noticed in the quality of the boards produced?

**Ease of Use:**

Does the current process require more or less effort than the previous process and why (e.g., chemical bath replacement, process steps or activities created or eliminated, such as rack loading, etc.)?

Does this process require more "fine tuning" than the previous process? (e.g., can it handle a range of operating concentrations, such as bath temperature variations? does it need more frequent chemical additions or monitoring? etc.). Explain:

**Installation:**

How long was the debug period when this system was installed?

What were the types of problems encountered?

How does this compare with the previous system installation?

**Manufacturing Process Changes:** How did you change your upstream or downstream processes when this system was installed? (e.g., did you change your desmear? did you have to make changes in your electrolytic line?)

**Personnel:** Do you need the same number of operators to operate the current line as your previous line? [Verify that any changes were not caused by a change in throughput].

**Waste Treatment:**

Have any of your waste treatment methods or volumes changed due to the installation of this system (not associated with volume changes due to throughput changes)?

If yes, describe the change(s) and attach quantitative information, if available:

**Process Safety:**

Have any additional OSHA-related procedures or issues arisen as a result of changing to the present system (e.g., machinery lock-outs while cleaning, etc.)? If so, describe:

**International Sites**

**For international sites only**, do any bans or phase-outs of chemicals affect your choice of chemicals or technologies used in the MHC process? (e.g., Quadrol or EDTA ban)

**For international sites only**, what is the regulatory atmosphere in the country and what effects does it have on the MHC process? Are applicable regulations local, regional, or national?